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ALLIANCE FOR THE CHESAPEAKE BAY

About Bay Grasses

By Karl Blankenship

The amount of sunlight reaching the bottom that that underwater grasses need to survive varies species by species. But generally, freshwater species need to receive 13 percent of the sunlight that reaches the water surface, while medium– and high-salinity dwellers need about 22 percent. Algae blooms and sediment in the water block sediment from reaching the leaves. Also, nutrients can spur the growth of tiny organisms, called epiphytes, directly on the leaves of plants, which also block sunlight.

When the plant receives energy in the form of light from the sun, it is able to draw carbon dioxide from the water and produce oxygen via photosynthesis. That oxygen is transported through tiny chambers of the plant to its roots, where it is released into the soil, creating conditions that allow the plant to survive. Those air chambers also act as “gas bags” that help the plants to float upright in the water.

Bacteria in the sediment break down organic matter, such as dead algae, plant leaves and other material, that sink to the bottom. Their respiration draws oxygen out of the sediment, creating a habitat without oxygen that is toxic to plants, and can kill their roots.

Value of Grass Beds

Underwater grasses were so important for waterfowl that some grasses— such as redhead grass and widgeongrass —are named for some of the birds that dine on them. As went the grasses, so did the waterfowl, which flocked out of the Bay as grasses disappeared. The few canvasback ducks that remained in the Chesapeake had to switch from being herbivores that ate grasses to clam-eating carnivores.

But underwater grasses are far more than duck food. Their beds are a biological factory that churns out huge amounts of tiny organisms that serve as fish food. Studies show that such production is far greater in grass beds than in barren areas that may be only a few feet outside the beds. Grass beds have more kinds of organisms—and more of them—because they have lots more to offer: roots, leaves, diverse soil conditions and more oxygen.

Lush underwater beds are important—at some point in the lives of many common fish species: croaker, red drum, menhaden, spot, spotted sea trout, eel, black sea bass, tautog, bluefish, summer flounder, striped bass and more. Between 50–75 percent of all economically important fish species along the East Coast spend some phase of their life in grass beds. Studies show that juvenile blue crabs are at least 30 times more abundant in grass beds than nearby unvegetated areas.

The benefits don’t end there. The grasses soak up nutrients that would otherwise form algae blooms, and they filter sediment from the water. Large beds provide a living baffle that reduces the power of waves before they hit the beach, thereby stemming shoreline erosion. Their roots stabilize sediment, keeping it from being resuspended into the water.

Underwater Grasses & Light

The first land plants evolved from simple algae about 450 million years ago. Initially, the rocky coastal waters around the planet’s landmasses were unsuitable for rooted vegetation. The roots of terrestrial plants, though, helped to speed the weathering process on the land, freeing sediment particles to flow downstream and into coastal waters. Underwater plants, in turn, evolved from terrestrial plants and “re-invaded” those coastal areas within the past 100 million years, taking root in the soft sediment.

Plants that took root in those sediments found a rich source of nutrients — but there was a steep price to pay. The sediments were often oxygen-starved, creating toxic conditions for grasses. Plants adapted by developing a mechanism to pump oxygen into their roots, effectively making the soil safe for habitation,

sort of a plant equivalent of a snorkel.

That snorkel requires a huge amount of energy to operate. As a result, underwater grasses require more sunlight than almost any other plants on Earth. It's a tough challenge that few plants have been able to meet. While land covers only a quarter of the planet's surface, it is populated by more than 250,000 plant species. Only a few hundred species globally have developed the ability to live under fresh water, and fewer still — only about 60 — can survive under salt water. Underwater grasses living in lower salinity areas of estuaries also have to cope with fluctuating salinity, which can also put stress on plants.

Marsh grasses and mangroves have developed similar survival mechanisms, but only submerged aquatic vegetation has developed the ability to survive totally underwater.

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